Constraints on the Optical Properties of Possible Source Regions for ALHA84001 and Other Martian Meteorites

L. A. McFadden (U. of Maryland), N. G. Barlow (U. of Central Florida)

The petrology of martian meteorites, especially their predominance of mafic silicate minerals (pyroxene and olivine) and cumulate textures, results in laboratory reflectance spectra which are unique among the meteorites. Their spectral signatures can be readily interpreted in terms of crystal field theory. An obvious question is whether or not such distinguishing spectral features can be extracted from measurements made with orbiting spacecraft to target possible sites from which to search for fossil evidence of life and to establish ground-truth with Mars. Previous work indicates the answer is yes (Sunshine et al. 1995 and Mustard and Sunshine, 1995). Possible craters from which these meteorites have been ejected have been cited (Barlow, 1996, Mouginis-Mark et al. 1992) based on the meteorites' ejection ages deterived from isotopic analysis. With laboratory spectra of the meteorites we can place further constraints on the optical properties of the most probable source regions on Mars. With the filter set included in the Mars Pathfinder Imager, the exposed rock signature of regions mineralogically similar to ALH84001, ALH77005, the three lithologies of EETA79001, and the SNC meteorites are different and distinguishable. If the sites from which the meteorites were ejected can be located and studied via spacecraft, then ground-truth will be established for Mars allowing an absolute age to be placed on martian cratering chronology, and a link between meteorite geochemistry and remote sensing measurements to be established. The arguements over priorities in selecting a site for a returned sample will be heated as the region from which the meteorites were ejected would also have been heated and evidence of life likely to have been destroyed in the fall back.

Abstract submitted for 1996 DPS meeting

Date submitted: LPI electronic form version 5/96

Division for Planetary Sciences Abstract Form

DPS Category 9 Running #7424 Session 0.00

Invited ☐ Poster presentation ☒ Title only ☐

Have you received your Ph.D. since the last DPS meeting?

Yes ☐ No ☒

Is your abstract newsworthy, and if so, would you be willing to prepare a news release and be available for interviews with reporters?

Yes ☒ No ☐ Maybe ☐

Paper presented by Lucy-Ann McFadden
Department of Astronomy
University of Maryland

College Park MD 20742 USA
Phone: 301-405-2081
Fax: 301-314-9067
Email: mcfadden@astro.umd.edu

Special instructions: Tue Aug 27 16:00:50 CDT 1996

Membership Status (First Author):

DPS-AAS Member ☒ Non-Member ☐

Student Member ☐ Student Non-Member ☐

Is this your first DPS presentation? Yes ☐ No ☒

Sponsor: